NEW RECORDS OF PHYTOPLANKTON FOR BANGLADESH. 4. CHLOROCOCALES

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Abstract

This study presents three species from each of Schroederia, Monoraphidium and Ankistrodesmus, two species and one variety of Dictyosphaerium, two varieties of Pediastrum, and Tetraedron arthrodesmiforme var. contorta, Chlorotetraedron polymorphum, Myrmecia aquatica, Oocystis tainoensis, Nephrocytium spirale, Kirchneriella irregularis, Coelastrum indicum and Scenedesmus similagineus. These taxa have been reported from some ponds of Mathbaria of Pirojpur and Bakerganj of Barisal Districts in Bangladesh.

Introduction

Chlorococcales comprises a large number of species which are predominantly aquatic and found to be most common in occurrence in samples of phytoplankton. They are mostly unicellular but may form colonies of rather definite shape. All of them have a characteristic in common that they are unable to multiply via vegetative cell division. At vegetative state the multiplication is generally carried out by autospore formation (Prescott 1982, Huber-Pestalozzi 1983).


In the present study, 22 taxa of Chlorococcales have been newly recorded for Bangladesh. The taxa were encountered in the plankton samples collected from different pond ecosystems of Mathbaria of Pirojpur District and Bakerganj of Barisal District between 2004 and 2006. New reports of phytoplankton for Bangladesh belonging to

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Cyanophyceae, Cryptophyceae, Xanthophyceae, Synurophyceae and the members of the order Volvocales from the same study areas have been published elsewhere (Khondker et al. 2006, 2007a,b).

Materials and Methods
Plankton concentrates, obtained by passing and sedimenting a definite volume of sample water through plankton net and by Lugol's solution in Pyrex glass bottle, respectively, were used for the present systematic analyses. The sampling was carried out from 1-8 and 1-6 permanent stations of Bakerganj and Mathbaria, respectively, in between 2004 and 2006. Details of the sampling procedure and descriptions of the sites have been published in Khondker et al. (2006).

Taxonomic enumeration
Twenty-two taxa of Chlorococcales belonging to eight families were identified from the pelagic plankton communities of different ponds of Mathbaria and Bakerganj. An illustrated account of these species is presented in this paper. For the systematic arrangement, Huber-Pestalozzi (1983) has been followed.

**Division: Chlorophyta; Class: Chlorophyceae; Order: Chlorococcales**

**Family: Palmellaceae**

1. **Chlorotetraedron polymorphum** (Mac Entee, F.J., H.C. Bold & P.A. Archibald)
   (Huber-Pestalozzi 1983, 128, 34: 12c)
   Cells solitary, somewhat tetrahedral or polyhedral. Chloroplast single, lying in close contact with the cell wall, pyrenoid single, seldom many. Cells 10-19 µm in diameter, without processes, process 4 µm long.
   Bakerganj, Station No. 4, 09.08.2004, Station No. 8, 06.09.2004.

2. **Myrmecia aquatica** G.M. Smith (Figs. 2a-b)
   (Huber-Pestalozzi 1983, 144, 41: 3)
   Cells solitary, ovoid, spherical, sometimes irregularly pyriform. Cell wall thin with mamillate thickening on one side. Chloroplast parietal, placed little away from the mamillate margin. Cells 8-10 µm in diameter.
   Mathbaria, Station No. 1, 16.08.2004.
Family: Characiaceae

3. **Schroederia antillarum** Kom.  
   (Huber-Pestalozzi 1983, 251, 74: 2)  
   Cells solitary, pale green in color, elongated spindle, curved; both the cell ends straight, hyaline and sharply pointed. Cells with pointed ends 25 µm long and 2 µm wide.  
   Bakerganj, Station No. 8, 09.08.2004.

4. **Schroederia planctonica** (Skuja) Philipose [Syn.: *Characium planktonicum* Skuja]  
   (Huber-Pestalozzi 1983, 250, 72: 3f)  
   Cells solitary, pale green in color, spindle-shaped, central portion bulged out, tips sharply pointed, thin, elongated, both the cell ends almost straight. Chloroplast with 1-2 or later on more pyrenoids. Mother cells show laterally divided proplasts probably prior to the zoospore production. Cells without pointed ends 15 × 11 µm, ends 23 µm long.  
   Bakerganj, Station No. 8, 29.11.2004.

5. **Schroederia spiralis** (Printz) Korš. [Syn.: *Ankistrodesmus nitzschioides* var. *spiralis* Printz.]  
   (Huber-Pestalozzi 1983, 252, 74: 4b)  
   Cells solitary, pale green in color, spindle-shaped. Both the cell ends sharply pointed and spirally bent. Chloroplasts lie adjacent to the cell walls, parietal, with distinct pyrenoids. Cells including spiral ends 35 µm long and 3 µm in diameter.  
   Mathbaria, Station No. 1, 30.08.2004.

Family: Hydrodictyaceae

6. **Pediastrum boryanum** var. *brevicorne* A. Br.  
   (Huber-Pestalozzi 1983, 296, 86: 5c)  
   Coenobia mostly compact and without perforation, (a single perforation is evident in the present specimen), 8-32-celled, cell wall lightly granulated, peripheral cells with two stubby processes, central cells nearly quadrangular. Coenobia 30.6 µm in diameter; individual cells 11.4 × 10.2 µm.  
   Mathbaria, Station No. 4, 04.07.2005.

7. **Pediastrum simplex** var. *sturmii* (Reinsch) Wolle [Syn.: *Pediastrum sturmii* Reinsch]  
   (Huber-Pestalozzi 1983, 288, 84: 2b)
Coenobia without perforation, 16-celled, cell wall regularly granulated, each peripheral cell with a single medium-sized process, central cells nearly quadrangular. Coenobia 38 μm in diameter. Peripheral cells 12.7 × 5.1 μm; central cells 4.6 × 3.5 μm.

Mathbaria, Station No. 4, 04.07.2005.

**Family: Botryococcaceae**

8. **Dictyosphaerium granulatum** Hind. (Figs. 8a-b)  
(Huber-Pestalozzi 1983, 354, 106: 1c)  
Colonies 4-16-celled, seldom with more cells, surrounded by a colorless mucilage sheath. Cells ovoid, broadly ovoid or spherical. Chloroplast single, bowl-shaped, pyrenoid present. Cell wall yellowish to brown, beset with irregularly arranged granules. Colonies 37 × 32 μm; individual cells 5 μm in diameter.

Mathbaria, Station No. 6, 30.08.2004.

9. **Dictyosphaerium pulchellum** var. minutum Defl. (Figs. 9a-b)  
(Huber-Pestalozzi 1983, 354, 105: 3)  
Colonies 4-16-celled, cells spherical, mucilage envelope not visible, cells loosely arranged. Cells 5 μm in diameter.


10. **Dictyosphaerium tetrachotomum** Printz (Fig. 10)  
(Huber-Pestalozzi 1983, 355, 107: 2)  
Colonies free swimming, mostly irregular, approximately 30 μm in diameter, no mucilage envelope. Cells weakly ovoid to spherical. Chloroplast single, lateral, bowl-shaped, always with a pyrenoid. Individual cells 3 μm in diameter.

Bakerganj, Station No. 2, 15.06.2004.

**Family: Oocystaceae**

11. **Oocystis tainoensis** Kom. (Fig. 11)  
(Huber-Pestalozzi 1983, 501, 20: 1)  
Cells elliptical, ends bluntly pointed, very seldom single, mostly 2-4-16-celled colonies. Polar thickenings invisible, in younger cells pyrenoid present. Colonies 14 × 8 μm, individual cells 5 × 3 μm.

Mathbaria, Station No. 6, 22.06.2004.
12. **Nephrocytium spirale** Beck-Mannag.  
(Huber-Pestalozzi 1983, 538, 157: 3)  
(Fig. 12)  
Colonies 4-8-celled, elliptic to oval. Cells spiral, more or less cylindrical, curved or screw-like, embedded in a colorless mucilage. Colonies 12 × 10 µm, individual cells 5 µm long (under curved condition) and 1.5 µm broad.  
Bakerganj, Station No. 2, 15.06.2004.

**Family: Chlorellaceae**

13. **Monoraphidium arcuatum** (Korš.) Hind. [Syn.: *Ankistrodesmus arcuatus* Korš.]  
(Huber-Pestalozzi 1983, 634, 177: 3)  
(Figs. 13a-b)  
Cells solitary, thin, spindle-shaped, more than 20 times longer than broad, ends gradually narrowed to a sharp point, curved like a circle. Chloroplast lie adjacent to the cell wall, pyrenoid absent. Cells 25-30 µm long (under curved condition), about 1.0-1.5 µm broad.  
Mathbaria, Station No. 1, 24.05.2004; Bakerganj, Station No. 2, 15.06.2004.

14. **Monoraphidium fontinale** Hind.  
(Huber-Pestalozzi 1983, 634, 177: 26)  
(Fig. 14)  
Cells solitary, elongated spindle, almost straight to lightly curved, ends not so sharply pointed. Cell wall hyaline, smooth. Chloroplast lie adjacent to the cell wall, pyrenoid absent. Cells 20 µm long, about 5 µm broad.  
Mathbaria, Station No. 1, 30.08.2004.

15. **Monoraphidium tortile** (W. & G.S. West) Kom.-Legn. [Syn.: *Ankistrodesmus tortilis* W. & G. West]  
(Huber-Pestalozzi 1983, 631, 176: 2)  
(Fig. 15)  
Cells solitary, elongated spindle, nearly 10 times longer than broad, straight or seldom lightly bent. Cell ends gradually tapered to a pointed tip. Chloroplast lies adjacent to the cell wall. Pyrenoid absent. Cells 21 µm long, about 2 µm broad.  
Mathbaria, Station No. 1, 16.08.2004.

16. **Ankistrodesmus bernardii** Kom.  
(Huber-Pestalozzi 1983, 687, 193: 3a,d)  
(Figs. 16-17)  
Colonial, cells in the colony form bundle, 2-8-many cells bound together in a single colony. Cells very narrow, elongated, thin, ends pointed. Many-celled colony 40.6 µm in diameter, individual cell 30.0 µm long and 0.8 µm broad.  
Mathbaria, Station No. 6, 22.06.2004, 30.08.2004.
17. **Ankistrodesmus densus** Korš. (Fig. 18)
   (Huber-Pestalozzi 1983, 687, 193: 2c)
   Colonial, cells in the colony joined end to end and alternately to form an elongated filamentous structure. Colorless thin mucilage may be present. Colonies 101.6 µm long and 5 µm broad. Individual cells 38 µm long and 2.5 µm broad.
   Bakerganj, Station No. 8, 11.07.2005.

18. **Ankistrodesmus stipitatus** (Chod.) Kom.-Legn. [Syn.: *Raphidium fasciculatus* status stipitatus Chod.] (Fig. 19)
   (Huber-Pestalozzi 1983, 684, 191: 2b)
   Solitary or in 2-4-8-celled colonies. Cells elongated, straight, very thin, sharply pointed at both ends, light green. Individual cell 40.0 µm long and 1.5 µm broad.
   Mathbaria, Station No. 6, 22.06.2004.

19. **Kirchnerella irregularis** (G.M. Smith) Korš. [Syn.: *Kirschneriella lunaris* var. irregularis G.M. Smith] (Fig. 20)
   (Huber-Pestalozzi 1983, 668, 186: 4a)
   Colonial, 4-16-(32)-celled, seldom solitary. Cells in the colony are arranged in a group of 4. Individual cells bent in a half-circle fashion, spindle-shaped, at the end gradually tapered, somewhat pointed or having a blunt end. Chloroplast lies adjacent to the cell wall. A single pyrenoid may be present. Colonies 25.6 µm long and 12.9 µm broad; individual cells 5 µm long and 1.5-2.0 µm broad.
   Bakerganj, Station No. 1, 15.06.2004.

20. **Tetraedron arthrodesmiforme** var. contorta Woloszyńska (Fig. 21)
   Cells solitary, 4-angled, angle smooth, tipped with spine, spine single, angles in one plane. Cells deeply constricted on both sides, each of the 4 lobes tipped with a spine. Cells quadrate in outline, isthmus is bordered by a widely open sinus, 40 µm wide (including spines) and 14 µm long.
   Mathbaria, Station No. 6, 30.08.2004.

Family: **Coelastraceae**

21. **Coelastrum indicum** Turn. (Figs. 22-24)
   (Huber-Pestalozzi 1983, 737, 205: 5)
Colonies spherical, free-living, (8)-16-32-(64)-celled. Cells spherical with angled undulated margin, triangular holes present in the colony. Chloroplast single, lies adjacent to the cell wall. Colonies 34-40 µm in diameter; individual cells 4-6 µm in diameter.

Mathbaria, Station No. 6, 30.08.2004, 09.11.2004.

Family: Scenedesmaceae

22. *Scenedesmus similagineus* Hortob. (Fig. 25) (Huber-Pestalozzi 1983, 856, 231: 5)

Coenobia 2-4-(8)-celled, linear, sometimes lightly bent. Individual cells elongated ovoid to spindle shaped, poles rounded, with small papillae like dents. Cell wall smooth. Coenobium (2-celled) 9 × 9 µm; individual cells 9 µm long and 4 µm broad.

Bakerganj, Station No. 1, 15.06.2004.

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